Office of Operating Experience Analysis, EH-33 • U.S. Department of Energy • Washington, D.C. 20585

OPERATING EXPERIENCE WEEKLY SUMMARY

Office of Nuclear and Facility Safety

July 30 - August 5, 1999

Summary 99-31

Operating Experience Weekly Summary 99-31

July 30 - August 5, 1999

Table of Contents

Visit Our Website

The Weekly Summary is available, with word search capability, via the Internet at **http://tis.eh.doe.gov/web/oeaf/oe_weekly/oe_weekly.html**. If you have difficulty accessing the Weekly Summary at this URL, please contact the ES&H Information Center, 1(800) 473-4375, for assistance. If you have additional pertinent information or identify inaccurate statements in the summary, please bring this to the attention of Jim Snell, (301) 903-4094, or e-mail address jim.snell@eh.doe.gov, so we may issue a correction.

EVENTS

1. FIRE ALARM STATION FAILURE RESULTS IN HALON DISCHARGE

On July 29, 1999, at the Hanford Plutonium Finishing Plant, a Fire Lite Alarms, Inc. BG-10 series manual fire alarm station failed, causing alarms to sound and 340 pounds of halon to discharge into gloveboxes. Personnel evacuated the affected building. Using security cameras, personnel at the Hanford patrol central alarm saw that no fire existed in the affected area. Hanford fire department personnel, responding to the fire alarm, also determined that there was no fire. The facility manager established a fire watch for the affected area. (ORPS Report RL--PHMC-PFP-1999-0031)

The facility manager initiated a work package to troubleshoot and repair the system. Investigators discovered that a screw pulled through the plastic cover of the alarm station. This permitted the spring-loaded activation switch to push the cover away, initiating the alarm and halon discharge. Figure 1-1 shows the alarm station with the gap in the cover, as found by investigators. Figure 1-2 shows the screw that pulled through the alarm station cover and the activation switch.

Figure 1-1. Tripped Alarm Station

Figure 1-2. Alarm Station Cover Screw and Activation Switch

Investigators found three other BG-10 alarm stations that exhibited cracks in the cover at the same location. The facility manager will replace all BG-10 alarm stations with another design. OEAF engineers will continue to investigate this occurrence and will report their findings in future issues of the Weekly Summary.

KEYWORDS: fire alarm, halon

FUNCTIONAL AREAS: Fire Protection

2. EMPLOYEES' INITIATIVE AVERTS UNSAFE WORK

This week NFS reviewed two occurrence reports from the Savannah River Site that demonstrate the value of attention to detail and personal intervention in mitigating potentially hazardous conditions. On July 29, 1999, an Electrical and Instrumentation (E&I) mechanic at the F-Area Tank Farm traced a cable and found an unexpected 120-V ac voltage source in a motor locked out for maintenance. (ORPS Report SR--WSRC-FTANK-1999-0022) Also on July 29, a maintenance mechanic at the Laboratory Technical Area reported that a pressure gage indicated 38 psig on a portion of a fire sprinkler system that had been isolated and locked out for preventive maintenance. (ORPS Report SR--WSRC-LTA-1999-0026) In each of these instances, employee alertness and initiative prevented personnel exposures to uncontrolled hazardous energy during planned maintenance.

Savannah River Site hazardous energy control procedures state that a lockout/tagout is established after (1) a lockout/tagout plan is developed and reviewed; (2) the affected system or equipment is shut down; (3) tags are placed by an installer; (4) locks are hung by an independent verifier; and (5) stored energy is released. Before work begins, however, work group representatives must independently verify isolation and confirm the status of the lockout/tagout. Site safety and health personnel view the discovery of a hazardous condition after a lockout/tagout has been established as a near-miss occurrence.

At the F-Area Tank Farm, the E&I mechanic and his supervisor determined that the motor starter would be the best place to verify isolation for an air compressor motor because it provided the closest access to the motor. They measured voltage at the starter before the lockout was installed and measured zero voltage after the lockout was established. However, when the E&I mechanic accompanied a subcontractor to the work site, he noticed a small conduit that entered the motor separately from the main power conduit. He traced the conduit to its source and discovered 120 V ac where the wires terminated at auxiliary contacts in the motor controller. The conduit supplies a space heater in the motor housing that is energized to control moisture when the motor is idle. Subsequent investigation revealed that the single-line electrical diagram used to plan the lockout did not show the heater wiring.

At the Laboratory Technical Area, operating personnel established a lockout to permit preventive maintenance on the air compressor for a supervised dry-pipe sprinkler system. These systems use closed (fused) sprinklers heads with sprinkler headers pressurized with air or nitrogen. When the heat of fire opens one or more sprinkler heads, decreasing pressure in the header unbalances an air-over-water clapper valve that admits water to the header, which then flows from the open head(s). A maintenance mechanic performing a verification of isolation after the lockout was established noticed a pressure gauge showed that the isolated portion of the system was still pressurized. He immediately notified facility operators, who released the lockout and restored the system to its normal configuration. Investigation revealed that a drain valve that had been tagged and verified open to vent the system was actually jammed in the closed position.

NFS reported in Weekly Summary 99-22 on an occurrence in which personal intervention averted potential serious injury. Electricians at the Los Alamos National Laboratory wired a new control panel for a replacement vacuum pump using an existing 480-V ac power source even though the control circuits were designed for 208 V ac. The design change package for the work clearly stated that no changes to the existing electrical power would be required. The condition was discovered when an electrician expressed concern that the design change package did not include electrical prints for the work he had been asked to do. A facility employee obtained the prints and reviewed them with the electrician. They discovered the error, and the facility manager designee issued a formal stop-work order on the pump replacement activities before the control circuits were energized. (ORPS Report ALO-LA-LANL-TA55-1999-0030) Several similar occurrences have been reported to ORPS. Some examples follow.

- On June 8, 1999, a rigger at the Hanford 324 Facility questioned the safety of planned lifts to remove empty liquid nitrogen tanks from the facility. He voiced his concerns to the facility point-of-contact, who stopped the operations until his concerns could be addressed. Specifically, personnel were preparing to lift off the front of a boom truck without an OSHA-required load chart permitting the operation and an additional sheave and hoist assembly attached to the boom was not supported by the manufacturer's charts or manual. (ORPS Report RL--PHMC-324FAC-1999-0009)

- On September 15, 1998, electricians preparing to calibrate a trap level detector at the Oak Ridge Y-12 Nuclear Operations Facility discovered 480 volts on a line that they believed was de-energized and locked out. One of the electricians discovered the condition when he performed an additional, precautionary voltage check after he had encountered a wiring configuration that he did not expect. Investigators determined that the lockout had been inadequately established. (ORPS Report ORO--LMES-Y12NUCLEAR-1998-0074)
- On September 9, 1998, at the Brookhaven National Laboratory, a medical department employee requested a stop-work order to determine if electrical arcing could pose a hazard to patients lying on the metal bed for a neutron generator. The equipment was inadequately grounded and a visiting scientist had requested temporary repairs so that he could analyze an unscheduled patient. A facility support representative removed the enable key from the equipment and installed a hold tag to prevent further use until permanent repairs were made and the unit inspected by an electrical engineer. (ORPS Report CH-BH-BNL-BNL-1998-0030)

These occurrences and the actions of the personnel involved underscore the importance of such traits as attention to detail, a sense of ownership, a questioning attitude, and continuing safety awareness to the conduct of operations. The success of any administrative or physical barrier to employee injury or equipment damage, no matter how well it is designed and developed, depends on its implementation by conscientious employees.

Facility managers have reported personnel error as the direct cause for 12,771, or approximately 32 percent, of 39,558 occurrences in the ORPS database for which final reports have been issued. This information suggests that the occurrences might have been prevented by giving adequate attention to detail, using procedures or using them correctly, or communicating effectively. Occurrence reports, accident investigation reports, and other experience-based documents, such as this Weekly Summary, focus necessarily on the adverse aspects of occurrences, their causes, and the lessons to be learned. However, significant lessons can also be learned from the actions that individual employees take to avert hazardous situations or mitigate occurrences in progress. Occurrence investigators should routinely identify and recognize these actions in facility managers' evaluations of occurrences, lessons learned statements, and specially prepared lessons-learned papers or employee briefings.

KEYWORDS: conduct of operations, lessons learned, lockout and tagout, personnel error, stop work

FUNCTIONAL AREAS: Conduct of Operations

3. SWIVEL RING FAILURE DURING HOISTING OPERATION

On July 27, 1999, at the Oak Ridge National Laboratory, a swivel hoist ring failed when a site rigging crew attempted to lift an empty 4,700-lb shielded cask from a truck. The cask is designed and fabricated to transport canisters of uranium-233. The swivel hoist ring, manufactured by The Crosby® Group, Inc., had a working load limit of 4,000 lb. The swivel rings had not been tested other than by the manufacturer; however, the rigging crew did inspect them visually before the attempted lift. The crew used two of the swivel hoist rings to lift the cask, and one ring failed before they lifted the cask from the truck. The rigging crew stopped the lift, and facility personnel discontinued use of Crosby® hoist rings until they determine the cause of the failure. If the hoist ring had failed after the cask left the truck, while the cask was in the air, members of the rigging crew could have been injured. (ORPS Report ORO--ORNL-X10CHEMTEC-1999-0014)

Figure 3-1 shows the Model HR125 hoist ring that failed. These swivel hoist rings are quenched and tempered alloy steel. They have a design factor of 5 to 1 and are individually proof-tested to 2.5 times the working load limit. The rings are fatigue-rated to 20,000 cycles at 1.5 times the working load limit.

Figure 3-1. Failed Crosby® Model HR125 Swivel Hoist Ring

Investigators determined that before this lift attempt riggers had used these swivel hoist rings more than ten times to lift and move the cask between a fabrication shop and the facility. They also determined that, since the hoist rings were last used to lift the cask, they had been used to secure the cask to the truck more than once in a manner contrary to the manufacturer's instructions. When the rigging crew used the lift rings to tie down the cask, they pulled the rings down more than 90 degrees from vertical. Investigators learned that the pivot pins on both sides of the failed lifting-ring were broken. They believe the pins may have been broken before the crew attempted the lift. Indentations on the cask from the swivel ring that did not fail indicate that the crew also inappropriately used it as a tie-down point. Investigators believe that using the hoist rings as tie-downs may have overstressed them. They are performing a metallurgical examination to determine the failure mechanism of the failed ring and will dispose of the swivel hoist ring that did not fail.

NFS has reported many hoisting and rigging events. Some examples of hoisting and rigging equipment failures follow.

- Weekly Summary 99-23 reported that at the Idaho National Engineering Laboratory Test Area North, a lifting eyebolt separated from a shipping container lid as operators attempted to remove the lid, which was not completely disengaged. As a result, they were using a 10-ton overhead crane and sling to remove what they thought was an 850-lb lid. However, what they were really attempting to raise was the combined weight of the container, its contents, and the lid, or approximately 55,000 lb. Although all personnel were well clear of the area of the container when the eyebolt failed, this occurrence was significant because of its potential for personnel injury and equipment damage. In addition, the facility incurred the cost of process delays and damage assessments for the crane and the shipping container. (ORPS Report ID--LITC-TAN-1999-0006)

- Weekly Summary 99-21 reported that at the Argonne National Laboratory—East CP-5 Reactor a nylon lifting sling broke when riggers attempted to remove a 400-lb beam port casting from the face of a concrete biological shield with a polar crane. The recoil caused the crane block to swing over the biological shield, but it did not hit it. The riggers believed the casting was loose from the concrete and attempted to remove it three times before the sling broke. The riggers had inspected the sling before the lift attempts, but they did not inspect the beam port casting, which had sharp edges. As a result of this event, facility managers required all crane operators and riggers to be retrained on the proper selection, inspection, and placement of rigging, including the need for careful visual inspection of the load and rigging before a lift attempt is made. They also required the inspection of all rigging equipment to ensure that prior hoisting and rigging activities had not damaged them. (ORPS Report CH-AA-ANLE-ANLEER-1999-0008)

- Weekly Summary 97-37 reported that, at the Hanford N-Reactor a 460-lb submersible pump dropped when a 3/8-in.-diameter carbon-steel choker broke during a lift. The pump was suspended 1 ft above the water at the N-Basin south load-out pit when the rigging broke. The pump drifted down and settled on the bottom, 20 feet below the surface. Investigators determined that the choker, a short wire-rope sling used to form a slip noose around the pump, was weakened by corrosion from chemicals added to maintain the basin-water pH. The choker had been submerged in the basin for over a year, and the riggers did not inspect it before the lift. (ORPS Report RL--BHI-NREACTOR-1997-0016)

Hoisting and rigging equipment failures can also occur from underestimating or incorrectly calculating the weight of a load. Refer to article 5 in this Weekly Summary for an example of this type of event.

Failures of rigging or hoisting fixtures under load are dangerous, not only because of dropped loads, but also because they can create missile hazards. These occurrences underscore the need for special attention to the inspection of hoisting and rigging accessories before use. Rigging accessories having any of the following conditions shall be removed from service: (1) cracks, (2) distortion or deformation exceeding 15 percent of new conditions, (3) any sign of incipient failure in shear for shackle pins, (4) wear exceeding 10 percent of original dimensions, (5) excessive corrosion, or (6) heat damage. Even though the rigging crew at Oak Ridge inspected the swivel hoist rings before attempting to lift the cask, they did not detect the overstressed condition of the rings. DOE-STD-1090-99, *Hoisting and Rigging*, provides guidance for hoisting and rigging and identifies related codes, standards, and regulations. The following sections of the standard contain information about hoisting and rigging accessories.

- Chapter 11, “Wire Rope and Slings,” provides requirements for the fabrication and use of wire rope and slings used in hoisting and rigging. It includes information about wire rope lays, purposes, inspections and maintenance. This chapter also discusses inspections, testing, and operation of slings made from wire rope, alloy steel chain, metal mesh, and synthetic web.

- Chapter 12, “Rigging Accessories,” provides requirements for inspecting, testing, and using shackles, eyebolts, rings, wire-rope clips, turnbuckles, rigging hooks, and load-indicating devices used in hoisting and rigging. It states that an operator or other designated person shall visually inspect rigging accessories at the beginning of each work shift or before use. It also states that a designated person shall determine whether conditions found during the inspection constitute a hazard and whether a more detailed inspection is required. Good and bad rigging practices are also illustrated in this chapter.

- Chapter 13, “Load Hooks,” describes safety standards for inspecting, testing, and maintaining load hooks installed on cranes or hoists and implements the requirements of ASME B30.10, chapter 10-1, “Hooks.”

- Chapter 14, “Below-the-Hook Lifting Devices,” provides requirements for spreader bars, lifting yokes, and lift fixtures used in hoisting and rigging. This section of the standard implements the requirements of ASME B30.20, “Below-the-Hook Lifting Devices.” Below-the-hook lifting devices are arranged in the following groups: (1) structural and mechanical lifting devices, (2) vacuum lifting devices, (3) close-proximity-operated magnets, and (4) remote-operated magnets.

Warnings and application instructions for the use of Crosby® swivel hoist rings can be found at http://www.thecrosbygroup.com/Crosby/. The site also illustrates proper and improper uses of these lifting accessories.

KEYWORDS: hoisting and rigging, lifting device, industrial safety, rigging

FUNCTIONAL AREAS: Hoisting and Rigging, Industrial Safety

4. FALL PROTECTION EQUIPMENT CAUSES WORKER TO LOSE BALANCE AND FALL

On July 27, 1999, at the Argonne National Laboratory—West Transient Reactor Facility, a rigger removing roof panels from the top of a 25-ft-high enclosure fell approximately 4½ ft when he ran out of lanyard on his fall protection equipment and lost his balance. The rigger sustained scrapes to his left leg and his right arm. The rigger was moving a corrugated metal panel that he had lifted and pushed as far as he could. To gain additional leverage he stepped onto a brace for a fire line. As he walked across the brace, he was abruptly halted when he ran out of lanyard. He lost his balance, and fell 18 inches to the sheetrock ceiling of the enclosure. The sheetrock could not support his weight, so the rigger fell through for another 3 ft, and ended up straddling a metal ceiling joist. The job supervisor immediately shut down the job and took the rigger to a dispensary for treatment. Although the rigger's fall protection equipment did not break his fall, it would have prevented him from falling beyond 6 ft. (ORPS Report CH-AA-ANLW-TREAT-1999-0003)

Riggers were attaching rigging to one of the roof panels to relocate two 3-ft by 15-ft corrugated pieces of metal. The worker performing the rigging wore a safety harness in accordance with an approved safe work permit. He attached himself to the hook of an overhead crane or a roof girder at all times to ensure that he would not fall more than 6 ft. He attached rigging to the roof panel without incident, but he had to move a sheet of corrugated metal to lift the roof panel. While positioning himself to push the corrugated metal piece, the rigger ran out of lanyard and fell.

The facility manager held a critique to discuss the incident. Critique members decided to terminate removal of the enclosure roof until they could reevaluate fall hazards and protection measures. Facility safety personnel may decide to use safety lanyards that incorporate an inertia take-up reel (retractable lanyard) that allows the lanyard to play out before the user reaches a hard stop.

NFS reported an event in Weekly Summary 96-29 in which the use of a retractable lanyard prevented a possible injury or fatality. On July 11, 1996, at the Fernald Environmental Management Project, a subcontractor employee escaped injury when his retractable lanyard activated as he fell through the roof of a four-story building (approximately 65 ft) that was being demolished. The employee lost his footing and fell forward onto an area where a layer of roof panels had been removed. His weight caused the remaining panel to give way, and he fell. The employee was wearing a full-body safety harness with a retractable lanyard that tightened and stopped his fall after 6 to 8 ft. The employee was treated for a bruise on his forearm and a scratch on his elbow. (ORPS Report OH-FN-FERM-FEMP-1996-0038)

The event at the Transient Reactor Facility illustrates that personnel who use fall protection equipment must be aware of equipment limitations, such as those imposed by the length of the lanyard. The fall protection used in this event would have prevented the rigger from falling more than 6 ft. However, this event shows that even while wearing a safety harness, workers can be injured if obstructions exist in the path of the fall. Personnel should exercise good judgement when stepping out onto objects requiring good coordination to maintain their balance. While tethered, personnel should restrict their movements to ensure they do not challenge the safety equipment. If necessary, attachment points should be relocated. Personnel should not let the use of fall protection equipment provide a false sense of security whereby they place themselves at risk.

OSHA Publication 3146, *Fall Protection in Construction,* discusses general fall protection concepts; 29 CFR 1926, subpart M; and fall protection systems, including (1) covers, (2) guardrail systems, (3) personal fall arrest systems, and (4) safety net systems. The publication also discusses a mandatory training program for employees who might be exposed to fall hazards, including ways to recognize and minimize the hazards. It also provides fall protection guidance and discusses how to select fall protection systems. The OSHA publication can be obtained at http://www.osha-slc.gov/SLTC/fallprotection/index.html. It can also be obtained by contacting a local, regional, or area OSHA office (listed in the telephone directory under U.S. Department of Labor) or writing to OSHA Publications Office, 200 Constitution Ave., NW, Room N-3101, Washington, D.C. 20210. OSHA regulations are available at http://www.osha-slc.gov/.

OSHA regulation 29 CFR 1926.502, "Fall Protection Systems Criteria and Practices," requires employers to provide and install fall protection systems for employees and to comply with all other pertinent requirements before employees begin work that necessitates the fall protection.

DOE facility managers should review their requirements and procedures to ensure that employees are familiar with both site and OSHA fall protection for performing work on roofs, towers, stacks, and buildings.

KEYWORDS: fall, fall protection, industrial safety, injury

FUNCTIONAL AREAS: Industrial Safety

5. OVERLOADED RIGGING FAILS DURING LIFTING OPERATION

On July 29, 1999, at Sandia National Laboratory—Albuquerque, a wire-rope sling failed while a contractor was lifting a 15-ft by 25-ft door assembly. The ½-in. wire-rope sling broke into two pieces when the load was within 2 ft of its set-down location. One side of the door assembly was already on the ground, but the other side fell approximately 2 ft, damaging an electrical box and slightly bending some support framing. The sling was rated for 3,200 lb but the load weighed approximately 9,800 lb. No one was injured as a result of the sling failure. Using a sling improperly rated for the working load can result in dropped loads, equipment damage, and personnel injury. (ORPS Report ALO-KO-SNL-1000-1999-0006)

Electromagnetic Facility managers hired the contractor to move two experimental chambers from one building to another. When the door assembly for one of the chambers was ready to be moved, the contractor's riggers used their own wire-rope sling in a choker configuration to rig the load. They assumed the load weighed approximately 3,000 lb. Sandia National Laboratory provided a crane operator because Laboratory procedures prohibited the contractor from operating the crane. The riggers and crane operator visually inspected the sling and determined it was in good working condition. The crane operator asked about using a synthetic sling, but the contractor was worried because the load had sharp edges. There was no tag on the sling indicating its working load limit, so the operator asked if the sling was capable of lifting the load. When the contractor assured the operator that the sling was adequate, the crane operator lifted the load and moved it with the crane until the sling failed. Figure 5-1 shows a close up of the failed wire-rope sling.

Figure 5-1. Failed Wire-Rope Sling

After the load dropped, the contractor stopped the work and notified a safety engineer. The safety engineer responded to the scene and requested that crane maintenance personnel inspect the crane before resuming any lifting operations. The inspectors determined that the crane was not damaged and placed it back in service. The safety engineer met with all involved parties to discuss responsibilities for making future lifts associated with this project.

Investigators learned that the fabricator of the door assembly indicated that it weighed 5,200 lb. Figure 5-2 shows the door assembly. However, using a load cell, a crane inspector determined the actual as-built weight of the door assembly was approximately 9,800 lb. This weight was well within the 10-ton working load limit of the crane. Investigators have not yet determined how the contractor arrived at their 3,000-lb estimate for the load.

Figure 5-2. Door Assembly

NFS has reported other sling failures in the Weekly Summary. Some examples follow.

- Weekly Summary 98-05 reported that a nylon sling failed while subcontractor riggers used a front-end loader to lift a 3,771-lb, 10-ft-diameter by 16-ft-long corrugated steel pipe at the Fernald Environmental Management Project. The riggers had cut two holes 180 degrees apart at one end of the pipe so they could attach shackles to the pipe. Investigators believe that the sharp edge of the corrugated pipe cut the sling as riggers lifted the pipe from a horizontal position to a vertical position. They also determined that the sling capacity did not meet the requirements specified in the lift plan. (ORPS Report OH-FN-FDF-FEMP-1998-0001)

- Weekly Summary 96-07 reported that the wrong capacity sling was used to rig and hoist a transfer cask shield ring at the Argonne National Laboratory—West Hot Fuel Examination Facility. A crane operator and a technician used a three-leg wire-rope sling that was not normally used for that operation. A tag on the sling indicated the rated capacity (maximum working load permitted) was 2,500 lb. However, the shield ring weighed 5,200 lb. Investigators determined that the crane operator and the technician did not check the load weight and capacity of the rigging before lifting the shield ring. (ORPS Report CH--AA-ANLW-HFEF-1996-0001)

- Weekly Summary 92-31 reported that a worker was fatally injured at the Oak Ridge K-25 Site when a tie-down strap being used as a lifting strap failed while lifting a 6,800-gal storage tank. (ORPS Report ORO--MMES-K25GENLAN-1992-0094)

These events illustrate the dangers associated with using rigging that does not have the rated capacity to handle the intended load. It is also important to determine the weight of the load by labels or markings on the load, manufacturer's information, or information provided by a subject matter expert. A test lift can be performed or load-indicating devices (load cells) can be used to ensure that rated capacities will not be exceeded. The person in charge, the crane operator, and the riggers must be very attentive to ensure that lifts are performed safely. Serious hazards can be created if hoisting equipment is overloaded or the load is improperly rigged. See article 3 in this Weekly Summary on an event involving the failure of a lifting device that was used improperly and overstressed.

DOE-STD-1090-99, *Hoisting and Rigging*, provides guidance for hoisting and rigging and identifies related codes, standards, and regulations. The following guidance applies to this event.

- Section 7.5.5, "Size of Load," states that the weight of the load shall be determined before making the lift. This section also states that crane and rigging equipment shall not be loaded beyond its rated capacity, except for authorized testing described in section 7.3.

- Section 7.5.8, "Ordinary Lifts," states that personnel should ensure that the weight of the load is determined, that proper equipment and accessories are selected, and that the rated capacity is not exceeded.

- Section 12.8, "Load-Indicating Devices," provides guidance for the use of load-indicating devices or load cells. Load-indicating devices are not required in routine operations where loads of known and essentially consistent weight are to be handled. Rather, load-indicating devices are required for use with loads of uncertain weight that could be within 90 to 100 percent of the rated capacity of the equipment or maximum working load of any part of the tackle.

KEYWORDS: hoisting and rigging, industrial safety, lift, rigging, sling

FUNCTIONAL AREAS: Hoisting and Rigging, Industrial Safety

6. FAILURE TO PERFORM CRITICALITY ALARM SYSTEM COMPENSATORY MEASURES

On July 28, 1999, at the Rocky Flats Environmental Technology Site, the Plutonium Processing and Handling facility manager reported a technical safety requirement violation because no one completed a Criticality Accident Alarm System (CAAS) remote alarm watch for 8 hours following a missed sitewide CAAS surveillance. A Justification for Continued Operations (JCO) requires the facility manager to assign criticality alarm panel watches as a compensatory measure when surveillance testing is not performed or test results are unsatisfactory. The JCO also requires Central Alarm Station personnel to perform a surveillance on the Unity fire and security computer system at least once every shift. However, on July 6, Central Alarm Station personnel failed to perform one of the required Unity surveillances. They then failed to notify the Plutonium Processing and Handling Facility personnel for 8 hours that the surveillance had not been performed. Because no one notified them, Plutonium Processing and Handling personnel did not know to implement the required CAAS compensatory measures. On July 8, A DOE Facility Representative identified the failure to perform the required surveillance and associated facility notification. The failure to perform the Unity computer system surveillance was reported to the Occurrence Reporting and Processing System on July 12 as a sitewide event. Failure to implement compensatory measures degraded the safety environment for workers and resulted in a technical safety requirement violation. (ORPS Report RFO--KHLL-371OPS-1999-0044)

Investigators determined that poor communication of the JCO requirements to the personnel performing the surveillance was a major contributor in the failure to perform the surveillance and facility notification. Central Alarm Station personnel were not aware of the safety function the CAAS remote alarm provides. After the event, Central Alarm Station personnel believed that failure to notify the facility of the missed surveillance was a minor event and that a fact-finding meeting was unnecessary. DOE and Rocky Flats Field Office personnel requested that they conduct a fact-finding meeting. Corrective actions from the fact-finding meeting included improving communications between the contracting organizations responsible for implementing the JCO.

NFS reported a similar event at the Rocky Flats Environmental Technology Site in Weekly Summary 99-07. While performing a manual verification of fire alarm system delta points, fire protection personnel discovered that some delta points were not reporting to the new Unity sitewide fire protection system. Fire protection managers directed site personnel to implement fire and criticality alarm panel watches sitewide, but only about half of the facilities implemented these compensatory measures. Investigators determined that the analytical operations shift manager sent e-mails to facility personnel to implement the watches when the reporting problem was discovered. However, facility personnel believed that the watches were optional, so they did not implement them. (ORPS Report RFO--KHLL-ANALYTOPS-1999-0003)

These events underscore the need for communication between facility managers and personnel who are responsible for monitoring important safety systems. Compensatory measures, such as establishing criticality watches, need to be implemented when personnel fail to perform surveillance testing or when testing is unsatisfactory. Facility managers must be notified of any change in safety-related system status, including when these systems are returned or removed from service. Prompt notification that impaired or degraded systems have been returned to service is important for facility safety. Facility managers should ensure that work controls are rigorous enough to prevent unplanned system impairment and are adequate to maintain facility and personnel safety during planned impairments. These events also underscore the importance of ensuring that criticality systems are maintained in operational readiness. Work activities that render portions of these systems inoperable need to be controlled and documented.

DOE facility managers should review the following guidance to ensure that appropriate compensatory measures are taken when systems become inoperable because of failures, when required maintenance is being performed, or when surveillance requirements are not met.

- DOE O 420.1, *Facility Safety,* provides direction on establishing criticality safety program requirements. Section 4.3, "Nuclear Criticality Safety," invokes the requirements of several ANSI/ANS standards, including those contained in ANSI/ANS-8.19-1984.

- DOE O 5480.19, *Guidelines for the Conduct of Operations Requirements for DOE Facilities*, provides guidance on sound operating practices and invokes several ANS standards for basic elements and control parameters in programs for nuclear criticality safety. It states that accurate communications are essential for safe and efficient facility operation. Chapter VIII, "Control of Equipment and System Status," states that the operating shift should know the status of equipment and systems, and it discusses necessary communications needed to maintain proper configuration control. Changes in the status of facility equipment and systems should be reported to the governing stations or to the individual who authorized the change. Changes in the status of safety-related equipment and systems should be authorized by the supervisor and reported to the control area.

- DOE O 5480.22, *Technical Safety Requirements*, states that a limiting-condition-of-operation "establishes the lowest functional capability or performance levels of equipment required for normal safe operation of the facility." When a limiting-condition-of-operation is not met, remedial actions (as defined by the technical safety requirements) must be taken either to restore the system or component to an operable status or to place the facility in a mode in which the system or component is not required for continued safe operation. Violations of technical safety requirements occur as a result of (1) exceeding safety limits, (2) failing to take actions required within a required time limit, (3) failing to perform surveillances within a required time limit, and (4) failing to comply with administrative control requirements.

- ANSI/ANS-8.19-1984, *Administrative Practices for Nuclear Criticality Safety,* provides the criteria for administration of an effective nuclear criticality safety program for operations outside reactors in which there exists a potential for criticality accidents. Sections 4, 5, and 6 address responsibilities for managers, supervisors, and members of the nuclear criticality safety staff.

KEYWORDS: compliance, criticality safety, inspection, surveillance

FUNCTIONAL AREAS: Criticality Safety, Licensing/Compliance

7. FIRE SPRINKLER RECALL

On August 4, 1999, Mealane Corporation, in cooperation with the Consumer Product Safety Commission (CPSC), announced the recall of approximately 1 million Star brand fire sprinklers. These sprinklers could fail to activate during a fire, resulting in facility damage, financial loss, and personnel injury or death. Star sprinklers have been installed nationwide in nursing homes, hospitals, schools, resorts, stores, office buildings, warehouses, and supermarkets. The recall is limited to Star sprinkler dry-pipe models D-1, RD-1, RE-1, E-1, and ME-1, manufactured from 1961 through 1976. The name "Star" appears on the sprinkler along with the model number and date of manufacture. Figure 7-1 and 7-2 are diagrams illustrating the Star brand sprinkler and the associated markings .

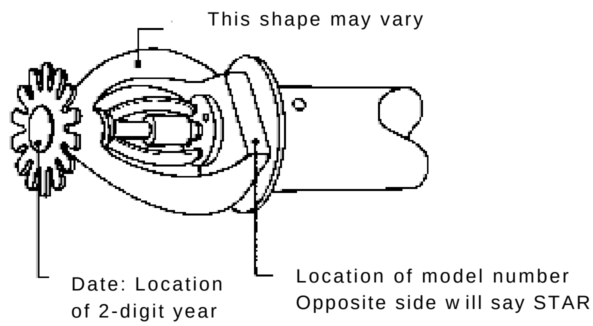

Figure 7-1. View of Pendent and Upright of Star Brand Sprinkler

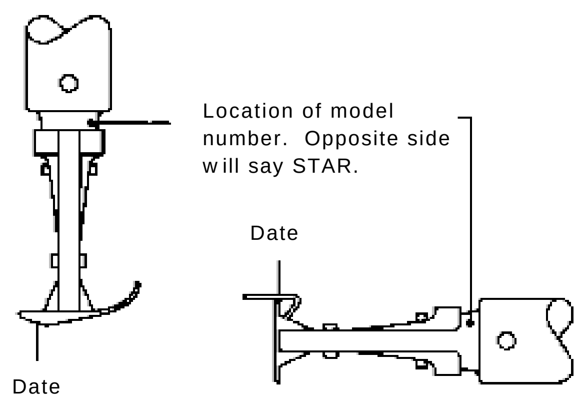

Figure 7-2. View of Vertical and Horizontal Sidewalls of Star Brand Sprinkler

CPSC reported that 67 percent of the Star sprinklers submitted for testing to independent laboratories failed to activate as they should. CPSC also said they received one report concerning a Star sprinkler that allegedly did not activate during a bedroom fire in a nursing home.

Facility managers should determine whether their facilities contain these recalled sprinklers, and, if so, call the Star sprinkler recall hotline at 800-866-7807 or access the recall web site at www.star-recall.com. Mealane Corporation will provide free replacement sprinkler heads and reimbursement for the labor costs of removing and replacing the recalled units. A CPSC press release and more recall information, including the diagrams of a Star sprinkler showing locations of identifying marks, are available at http://www.cpsc.gov/cpscpub/prerel/prhtml99/99152.html.

KEYWORDS: fire suppression, inspection

FUNCTIONAL AREAS: Fire Protection

OEAF FOLLOWUP ACTIVITIES

1. OPERATING EXPERIENCE WEEKLY SUMMARY NOW AVAILABLE VIA E-MAIL

The Office of Nuclear and Facility Safety is now able to send a .pdf version of the OEWS directly to your e-mail. Here are just a few benefits you will see when you have an electronic copy sent “straight to your desktop.”

- ***Faster delivery.*** The OEWS will arrive in a fraction of the time it takes to get your current hard-copy version.
- ***Full color.*** Pictures, drawings, and charts are in full color, so you can copy and paste them whenever you’d like.
- ***Easily reproducible.*** You can forward the electronic OEWS file to others who might be interested in reading it, or you can print out black-and-white or color copies at your computer for distribution.

To take advantage of the new electronic OEWS, all you need is an e-mail address and a .pdf reader, such as the Adobe Acrobat Reader. The Acrobat Reader is free and can be downloaded from the Adobe website at http://www.adobe.com/prodindex/acrobat/readstep.html.

Please fax or mail the Distribution Request Form in the back of this issue and check the "e-mail version" box provided. Or send your request, with "PLEASE ADD" in the subject line, to Christine Crow at ccrow@rpihq.com.